Complete Summary

GUIDELINE TITLE

Physical activity in the prevention, treatment and rehabilitation of diseases.

BIBLIOGRAPHIC SOURCE(S)

Finnish Medical Society Duodecim. Physical activity in the prevention, treatment and rehabilitation of diseases. In: EBM Guidelines. Evidence-Based Medicine [Internet]. Helsinki, Finland: Wiley Interscience. John Wiley & Sons; 2006 Dec 22 [Various].

GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: Finnish Medical Society Duodecim. Physical activity in the prevention, treatment and rehabilitation of diseases. In: EBM Guidelines. Evidence-Based Medicine [CD-ROM]. Helsinki, Finland: Duodecim Medical Publications Ltd.; 2004 Jun 29 [Various].

COMPLETE SUMMARY CONTENT

SCOPE

DISEASE/CONDITION(S)

- Coronary heart disease
- Dyslipidemia
- Hypertension
- Heart failure
- Stroke
- Obliterating peripheral arterial disease (intermittent claudication)
- Obesity

- Type 2 diabetes
- Type 1 diabetes
- Osteoporosis and osteoporotic fractures
- Osteoarthritis of the lower limbs
- Rheumatoid arthritis
- Low back problems
- Asthma
- Chronic obstructive pulmonary disease (COPD)
- Symptoms of anxiety and depression
- Sleep disturbance
- Smoking (cessation)
- Cancer

GUIDELINE CATEGORY

Prevention
Rehabilitation
Treatment

CLINICAL SPECIALTY

Family Practice
Internal Medicine
Preventive Medicine

INTENDED USERS

Health Care Providers
Physicians

GUIDELINE OBJECTIVE(S)

Evidence-Based Medicine Guidelines collects, summarizes, and updates the core clinical knowledge essential in general practice. The guidelines also describe the scientific evidence underlying the given recommendations.

TARGET POPULATION

- General population of adults
- Men and women with (or at risk of) diseases that might benefit from physical activity

INTERVENTIONS AND PRACTICES CONSIDERED

Physical Exercise, including:

1. Endurance training (aerobic exercise)
2. Resistance muscle training
3. Flexibility training

MAJOR OUTCOMES CONSIDERED

- Functional and physical capacity and endurance
- Quality of life
- Changes in resting blood pressure
- Changes in blood lipids
- Overall and cardiac mortality
- Walking distance
- Changes in body weight
- Body composition (e.g., fat-free mass)
- Development of type II diabetes
- Bone mass
- Symptoms of depression
- Smoking cessation
- Development of cancer
- Risks of physical activity

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Hand-searches of Published Literature (Primary Sources)
Hand-searches of Published Literature (Secondary Sources)
Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

The evidence reviewed was collected from the Cochrane database of systematic reviews and the Database of Abstracts of Reviews of Effectiveness (DARE). In addition, the Cochrane Library and medical journals were searched specifically for original publications.

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Levels of Evidence

A. Strong research-based evidence. Multiple relevant, high-quality scientific studies with homogenic results.
B. Moderate research-based evidence. At least one relevant, high-quality study or multiple adequate studies.
C. Limited research-based evidence. At least one adequate scientific study.
D. No research-based evidence. Expert panel evaluation of other information.

METHODS USED TO ANALYZE THE EVIDENCE

Review of Published Meta-Analyses
Systematic Review

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Not stated

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Not stated

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Not stated

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

The levels of evidence [A-D] supporting the recommendations are defined at the end of the "Major Recommendations" field.

<u>The Fundamentals of Physical Exercise</u>

- The physiological effects of physical activity are most marked in those parts of the body that are used most during exercise (i.e., the muscles, joints, bones, energy metabolism, circulation, as well as hormonal and neural regulation).
- For the effects to persist, physical activity must be regular. The effects may persist when the duration and frequency of exercise is slightly reduced, particularly if the intensity remains the same.
- Physical activity is the best way of ensuring the maintenance of functional capacity. Physical activity is therefore especially important in the prevention of the detrimental effects of ageing and chronic illnesses.
- Excessive or otherwise incorrect exercise may cause functional disorders or sports injuries. The margin between suitable and excessive exercise (i.e. the

therapeutic range of physical activity) may be narrow, particularly in those in poor health.

- The beneficial effects of endurance-type activity (aerobic exercise) to health and functional capacity have been studied the most. For endurance exercise to be beneficial, the intensity of the exercise in a healthy person needs to be at least 50%, preferably 60%, of the maximal aerobic power (maximal oxygen consumption, VO_2max). This means that the person's heart rate during exercise should be approximately 60 to 75% of his/her maximum heart rate. This type of exercise, for example brisk walking, is considered to be moderately intense. To improve cardiovascular fitness (energy metabolism and circulation), physical activity needs to include rhythmic movements of the large muscle groups which should be sustained for a considerable length of time (usually several tens of minutes). Walking, cross-country skiing, cycling, and swimming are examples of endurance (stamina) building exercise. Less information is available regarding the health benefits of resistance training (weight training), which increases muscle strength (Pollock et al., 2000).
- Physical activity plays a significant role in the prevention of coronary heart disease and other atherosclerotic diseases, hypertension, type 2 diabetes, osteoporosis and osteoporotic fractures, as well as some types of cancer (colon cancer and possibly also breast cancer). (U.S. Department of Health and Human Services [DHHS], 1996). Exercise reduces the risk of all-cause mortality by approximately 10% and of cardiovascular diseases by 20%.

Exercise Programmes

Cardiorespiratory (Aerobic) Fitness

- American College of Sports Medicine (ACSM), 1998.
- Moderate intensity (50 to 85% of VO_2max, the effect is more significant if the minimum intensity is 60%) endurance training 3 to 5 times per week (see table below; Dunn, Andersen & Jakicic, 1998).

Table: American College of Sports Medicine Exercise Recommendation

Endurance Training to Improve and Maintain Cardiorespiratory Fitness and to Develop and Maintain Body Composition	Resistance Training to Improve and Maintain Muscular Fitness and Flexibility
3 to 5 times per week	8 to 10 exercises, 1 set, 2 to 3 times per week. Each exercise is repeated 8 to 12 times, older persons should repeat each exercise 10 to 15 times.
(55–) 65 to 90% of heart rate (HR)max ([1], i.e., (40–) 50 to 85% of VO_2-reserve[2] [or HR-reserve[3]])	Flexibility (maintenance of the range of movement) at least 2 to 3 times/week
(40–) 50 to 85% of the VO_2 reserve (or HR reserve)	
20 to 60 minutes of continuous or intermittent (composed of bouts of at least 10 minutes accumulated throughout the day) exercise	

Endurance Training to Improve and Maintain Cardiorespiratory Fitness and to Develop and Maintain Body Composition	Resistance Training to Improve and Maintain Muscular Fitness and Flexibility
Large muscle groups (rhythmical, aerobic) • HRmax = maximal heart rate • VO_2 reserve = difference between maximal and resting oxygen consumption • HR reserve = difference between maximal and resting heart rate	

Health-related Physical Activity

- Guidelines originating from the United States (Pate et al., 1995) have been adopted and adapted in many countries.
- Health-related physical activity refers to exercise with health benefits and does not cause significant health problems. The intensity of such physical activity should be moderate, brisk walking being a typical example. When the intensity is kept moderate, possible disadvantages of exercise (sports injuries and cardiac events associated with insidious coronary heart disease) are avoided, particularly in those not accustomed to exercise.
- Recommendation: Every adult should engage in moderate-intensity physical activity for at least 30 minutes on most, preferably all, days of the week. Moderate intensity is defined as 40 to 60% of oxygen consumption reserve (= difference between maximal and resting oxygen consumption). The 30-minute activity can also consist of shorter exercise bouts (minimum of 10 minutes) (Hardman, 2001) that are accumulated throughout the day (e.g., walking or cycling to work, shopping or running other errands).
- There are also attempts to give guidelines of physical activity based on the daily amount of steps. 5,000 to 7,000 steps per day are needed for the so-called essential daily activities (independent living), and an amount of 10,000 to 12,500 steps per day indicates substantial physical activity (Tudor-Locke & Bassett, 2004). It must be kept in mind, however, that the amount of steps does not in any way tell the intensity of the physical activity, and there are sports that do not produce steps at all (swimming, cycling, skiing, resistance training).

Prevention of Coronary Heart Disease

- There is an inverse relationship between the occurrence of coronary heart disease and the amount of physical activity, or aerobic fitness. (Foster & Murphy, 2002) [C] (Williams, "Physical fitness, " 2001)
- Physical activity can have a beneficial effect on the major risk factors of coronary heart disease (hypertension, dyslipidaemias, obesity, insulin resistance), on factors affecting thrombosis formation, such as the function of the vascular endothelium, and possibly also on the electric stability of the heart. The most effective way of producing these effects is regular, frequent

endurance training of moderate intensity. In practice, this means physical activity such as brisk walking for 30 to 60 minutes on most days.

Prevention and Treatment of Hypertension

- Persons who take regular exercise have lower resting blood pressure than those who exercise only a little. (US Department of Health and Human Services, 1996). Endurance-type exercise lowers blood pressure on average by 4/3 mmHg (Halbert et al., 1997) [B]. The effect is less significant on ambulatory blood pressure (Kelley, 1996) [C] (Pescatello & Kulikowich, 2001). Resistance training may also lower hypertension to the same degree as endurance training (Cornelissen & Fagard, 2005).
- The exercise recommendation of ACSM 2004 (Pescatello et al., 2004) for mildly or moderately elevated blood pressure:
    - Moderate intensity (40 to 60% of the oxygen consumption reserve). Lower level of intensity is sufficient especially for the elderly.
    - Preferable daily, at least 30 minutes (either in one succession or divided in several bouts)
    - Various endurance exercise modes are suitable. Resistance training (preferably circuit training; low resistance, high number of repetitions) should not be the only form of exercise but should be combined with endurance training.
- Training at an intensity of about 50% of the VO_2max (moderate-intensity) is sufficient with regard to resting blood pressure reduction (Fagard, 2001).

Lipid Disorders

- Moderate-intensity endurance training may increase the serum concentration of high-density lipoprotein (HDL)-cholesterol (approximately 5% from baseline) and decrease the concentration of low-density lipoprotein (LDL)-cholesterol (5%) as well as triglycerides (4%) in healthy, sedentary individuals (Halbert et al, 1999) [B].
- A high amount of moderate-intensity physical activity over several months is needed in order to bring forth the beneficial effects on HDL-cholesterol concentration (Kraus et al., 2002). In practice, this means brisk walking or similar exercise for 30 to 60 minutes almost daily.
- The effect of physical activity on the LDL-cholesterol concentration is enhanced if the intake of saturated fats is reduced simultaneously. The above mentioned beneficial changes in the lipid profile may be further augmented with concurrent weight reduction (adipose tissue reduction) (Williams, "Health effects," 2001). Larger serum lipid changes are seen with the combination of low fat diet and exercise (Yu-Poth et al., 1999).
- Information regarding the effect of resistance training on the blood lipoproteins varies, and HDL-cholesterol concentration does not always increase. This is partly due to the lower energy consumption associated with moderate-intensity resistance training as compared with aerobic training.

Rehabilitation in Coronary Heart Disease

- Exercise-based cardiac rehabilitation reduces all-cause mortality by about 20% and cardiac mortality by about 25% compared with usual care of coronary heart disease, but it does not reduce the rates of nonfatal

myocardial reinfarction nor the need for revascularization surgery [A] (Taylor et al., 2004; Jolliffe et al., 2001)

- Recommendation (Fletcher et al., 1995)
    - Mainly endurance training
        - at an intensity of 50(–60)–75% of symptom-limited VO_2max (or heart rate reserve, which is the difference between maximal and resting heart rate) for 30 minutes 3 to 4 times weekly (minimum), full benefit is obtained with 5 to 6 times/week; and
    - Resistance training (Pollock et al., 2000).
        - at an intensity of 30 to 50% (up to 60 to 80%) of 1 RM (one repetition maximum), 12-15 repetitions, 1-3 sets twice weekly

Heart Failure

- Heart failure may develop after myocardial infarction or it may be associated with some other heart disease, like cardiomyopathies. One characteristic feature is dyspnoea in exertion and there have been attempts to reduce it by exercise, either of endurance or muscle strength type. Exercise may reduce symptoms and improve quality of life, and it is also safe [A] (Piepoli et al., 2004; Smart & Marwick, 2004).

Other Atherosclerotic Diseases

Stroke

- Physical activity may reduce the risk of stroke. More intensive endurance type exercise may reduce the risk more than less intensive exercise.
- Regular physical activity is one of the recommended methods of stroke prevention (Gorelick et al., 1999). Physical activity has an influence not only on atherosclerosis but also on other risk factors of stroke, such as hypertension, HDL cholesterol, insulin resistance, and blood coagulation factors. Dietary changes may enhance the effects of exercise. An exercise programme for the prevention of stroke is similar to the programme recommended for preventing coronary heart disease.
- In stroke rehabilitation, specific motor and physical exercises designed by professionals in neurology and physiotherapy are important in the correction of motor deficits. Endurance type training improves walking ability. There is no research data of the effects of training on mortality or dependence [D] (Saunders et al., 2004)

Peripheral Arterial Disease

- Regular physical activity may protect against intermittent claudication and lengthen the painless walking distance [B] (Leng, Fowler, & Ernst, 2000).
- In addition to smoking cessation, walking exercises up to the pain threshold several times a day form a central part of the treatment and of post-operative secondary prevention. Other types of exercise, such as resistance training, have not been shown to be clearly beneficial for symptom relief or for improvement of the functional capacity of the lower limbs.

Treatment of Obesity and Control of Weight (Prevention of Weight Gain)

- Management of obesity always requires permanent changes to the diet. It is important to distinguish between the phases of weight loss and weight maintenance. The general aim of weight maintenance is to prevent weight gain, particularly after successful weight reduction. It may be best to increase the amount of physical activity when actual weight reduction ends.
- Exercise alone (usually endurance-type) without a change of diet only reduces weight by a few kilograms (Wing, 1999; "Clinical guidelines," 1998) [A]. Training that aims to increase muscle strength (e.g., in the gym) has a beneficial effect on body composition (amount of muscle tissue i.e., fat-free mass [FFM] increases and that of fat tissue decreases), even if actual weight loss is limited. During a weight reduction diet, resistance training preserves a few kilograms more of FFM compared with endurance training (Garrow & Summerbell, 1995) [A].
- Exercise combined with a low-energy diet does not significantly improve weight reduction compared with diet alone; the additional weight loss is at the most only a few kilograms (Wing, 1999; "Clinical guidelines," 1998; Miller, Koceja, & Hamilton, 1997; Ballor & Keesey, 1991) [B].
- Physical activity reduces the intra-abdominal adipose tissue more than a diet even if the weight reduction is minor (Ross et al., 2000)
- Physical activity combined with a low-energy diet may improve weight maintenance after weight loss, compared with diet alone (Wing, 1999; "Clinical guidelines," 1998; Fogelholm & Kukkonen-Harjula, 2000) [C]. In intervention studies, the effects of exercise on weight have been rather modest compared with epidemiological follow-up studies in which increased physical activity appears to reduce weight gain (Wing, 1999).
- The energy expenditure during exercise that aims to weight reduction should be at least 1.3 MJ (300 kcal) of additional physical activity per day (Table 2 in the original guideline document). This translates to 45 to 60 minutes of moderately intensive exercise daily (less if the exercise is highly intensive). To achieve successful weight maintenance, weekly energy expenditure of up to approximately 10.5 to 11.7 MJ (2,500 to 2,800 kcal) may be needed (Wing, 1999; Fogelholm & Kukkonen-Harjula, 2000). This amount of energy consumption translates to 60 to 90 minutes of moderate-intensity physical activity daily (if the intensity is higher, the duration may be decreased) (Saris et al., 2003). However, even small amounts of daily physical activity (lifestyle activity) have been shown to have other health benefits (regardless of whether the overweight person loses weight or not).

Refer to Table 2 titled "Total energy expenditure (kJ or kcal) of a person weighing 70 kg during one hour of different modes of exercise" in the original guideline document.

Prevention and Treatment of Type 2 Diabetes

- A large amount of regular, moderate-intensity endurance training and ample lifestyle activity integrated into daily activities have a beneficial effect on the various components of the metabolic (insulin resistance) syndrome, such as abdominal obesity (increased waist circumference), hypertension, disturbance of lipid and glucose metabolism and insulin resistance. Similar effects may also be achieved with resistance training (Willey & Singh, 2003).
- Increased physical activity reduces the risk of type 2 diabetes and atherosclerotic artery diseases. The effect is most prominent in those with a

high risk of developing diabetes (e.g., persons with impaired glucose tolerance). (Tuomilehto et al., 2001; Knowler et al., 2002) [A].

- Frequent (at least 3 times a week) endurance exercise with at least moderate intensity increases insulin sensitivity, decreases the plasma insulin concentration and enhances glucose tolerance. Endurance and resistance training may improve diabetic control (glycosylated haemoglobin) but only have a slight effect on weight reduction (Boule et al., 2001).
- Physical activity reduces the risk of diabetic complications, such as coronary heart disease. On the other hand, the possibility or existence of any complications should be taken into account when prescribing exercise for people with type 2 diabetes. The risk of exercise-induced hypoglycaemia is negligible, unless the patient uses oral antidiabetic drugs.

Treatment of Type 1 Diabetes

- Regular, well-timed physical activity that has been adjusted according to insulin and nutrition intake can improve diabetic control. In addition, it has a beneficial effect on the risk factors of coronary heart disease and on life expectancy.
- Physical activity may, however, also impair diabetic control or cause hypoglycaemia. Hypoglycaemia can be prevented by consuming an extra amount of carbohydrates before exercise and by taking an additional 20 to 40 grams per one hour of exercise. Hypoglycaemia may also be prevented by reducing the insulin dose before exercise, by avoiding physical activity during the peak action of insulin and by using an injection site that is not in an area where exercise (muscle work induces increased circulation) would fasten its absorption.
- If the patient's blood insulin level is low before exercise, glucose uptake by the muscles will not increase, but the liver will produce large amounts of glucose. This may lead to hyperglycaemia. Vigorous activity may also induce delayed hypoglycaemia.
- A patient whose diabetes is well controlled can take part in almost any type of physical activity. However, diabetic complications, such as neuropathies, atherosclerosis, retinopathy and poor recovery from infections, should be taken into account when planning an exercise programme.

Prevention of Osteoporosis

- Peak bone mass increases in early childhood and adolescence and it can be increased with regular exercise (Vuori, 2001). The loss of bone mass becomes accelerated in menopausal women.
- Bone is strengthened when loading induces microscopic transient remodelling of its structure. The remodeling occurs only at the sites that are loaded.
- The mineral content of the bones is increased (or maintained) and the strength of the bone is improved by physical activity that is varied, weight bearing and that requires at least moderate strength. The exercise should preferably include rapid, multidirectional movements, and controlled impacts. Examples of such exercise modes are aerobics, and other types of exercise which involve jumping, as well as rapid racket games, such as squash. The weaker the bones, the less loading is needed to influence their strength. For example, walking maintains the bone mineral content in the elderly.

- The loss of bone mass in postmenopausal women may be reduced by physical activity. Aerobics as well as weight bearing and resistance training increase the bone density of the lumbar spine in postmenopausal women (Bonaiuti et al., 2002) [A]. Walking as such has an effect on the bone density of the femoral neck.
- Physical activity has a beneficial effect on the bone mass of premenopausal women.
- In men, exercise increases the bone mass at the femur, lumbar spine, and calcaneus (Kelly, Kelly, & Tran, 2000).
- Prevention of osteoporotic fractures
    - The aim is to maintain adequate bone mass and, in addition, to preserve gait and balance to prevent falls (Carter, Kannus, & Khan, 2001).
    - Versatile physical activity that maintains muscle control, moderate loading and strength as well as balance and agility, such as walking on uneven terrain, gymnastics, aerobics, dancing and racket games, is recommended within the limits set by the individual's physical condition and exercise skills.

Osteoarthritis of the Lower Limbs

- Normal daily activities probably provide sufficient loading for the joints. Prevention or reduction of excessive weight gain is probably beneficial in the prevention of osteoarthritis and also in the treatment (alleviation of pain).
- Sudden overloading, incorrect joint loading and various injuries predispose a person to osteoarthritis (Vuori, 2001).
- Exercise reduces the pain and functional disturbance in osteoarthritis of the knee (Fransen, McConnell, & Bell, 2001; McCarthy & Oldham, 1999; Petrella, 2000; Puett & Griffin, 1994; Van Baar et al., 1999) [A] and possibly also in osteoarthritis of the hip. Research data is so far insufficient for conclusions about the type of exercise that should be preferred (exercises aimed at increasing muscle strength, or endurance-type exercise like walking).
- Individually designed exercise programmes implemented under the supervision of a health care professional are beneficial in terms of overall fitness, joint problems and functional capacity. The programme should cover flexibility exercises, muscle strength training as well as endurance training ("Exercise prescription for older adults," 2001).

Rheumatoid Arthritis

- Exercise (dynamic muscle work) improves muscle strength, joint flexibility and cardiovascular fitness in rheumatoid arthritis, but evidence on its long-term effect on functional capacity is still uncertain (Van den Ende et al., 2001) [B]. Exercise does not have adverse effects on disease activity.

Prevention and Rehabilitation of Low Back Problems

- Regular exercise may prevent low back problems (Vuori, 2001). So far, no consensus has been established on the contents of an optimal exercise programme. However, it is essential to regularly use the muscles of the back, trunk and lower extremities and to maintain the mobility of the back by moderate and varied physical activity. In the prevention of back problems the

endurance of the muscles associated with the function of the back seems to be more important than their strength.
- Exercise is not particularly effective in the treatment of acute back problems (Vuori, 2001), but in the rehabilitation of chronic back problems a quick return to normal physical activity has been shown to be more beneficial than passive bed rest (van Tulder et al., 2001) [B].

Asthma

- Endurance training improves the cardiovascular fitness of an asthmatic patient, but its long-term effects on lung function, overall health and quality of life require further studies (Ram, Robinson, & Black, 2001) [C].
- In addition to traditional training programmes, interval exercises have been used as they may reduce exercise-induced asthma. Swimming (high air humidity) may cause less exercise-induced asthma than, for example, jogging.

Chronic Obstructive Pulmonary Disease (COPD)

- Increase of physical activity is an essential element in the rehabilitation of chronic obstructive pulmonary disease.
- In chronic obstructive pulmonary disease, physical exercise combined with conventional treatment improves functional capacity. Furthermore, exercise improves the quality of life, reduces dyspnoea and allows better mastery of the disease.
- There is little research on exercise counselling provided instead of rehabilitation in mild to moderate disease. It does not always necessarily produce any significant improvement in exertional endurance. (Chavannes et al., 2002)

Mental Health

- Physical activity may reduce anxiety (Fox, 1999; Montgomery & Dennis, 2002). Both endurance and resistance training may improve mood and cognitive function in the elderly (Ethier et al., 1997) [C].
- Physical exercise may reduce the symptoms of depression (Dunn, Trivedi, & O'Neal, 2001). It has not been established which mode of exercise is the most effective; however, it is important to prescribe exercise that the patient perceives as pleasant.

Sleep

- Physical activity can have both acute and long-term beneficial effects on sleep.
- Exercise training can increase the duration of deep sleep and total sleep time, and it may also decrease the amount of rapid eye movement (REM) sleep and the sleep onset latency (Montgomery & Dennis, 2002; Youngstedt, 2000). Exercise may also promote good sleep quality and daytime alertness in persons who work nights and in jet lag.

Cessation of Smoking

- Exercise may increase the success of smoking cessation as a part of other withdrawal therapy (Ussher et al., 2005; Marcus et al., 1999) [C].

Cancer

- Physical activity may prevent colon cancer and probably also breast cancer (Thune & Furberg, 2001). The effect may partly be mediated by the decrease in adipose tissue that in turn leads to decreased production of oestrogen hormones.
- Physical activity may also be beneficial for patients who have cancer because it may improve physical functional ability and decrease fatigue and osteoporosis that may be associated with cancer treatments (Stevinson, Lawlor, & Fox, 2004; Brown, Byers, & Doyle, 2003). There is insufficient research evidence on the effect of physical activity on the prognosis of cancer.

Physical Activity Counselling by the Physician

- Advising patients about physical activity forms a part of overall health education with the aim to introduce lifestyle changes (Eden et al., 2002). Physical activity counselling also includes patient education regarding his/her illness (does the illness set limitations to the amount of exercise; will exercise pose an increased risk?). Physical activity counselling is often combined with dietary advice. Physical activity promotion is a broader concept and is analogous with health promotion.
- Physical activity counselling provided by a physician or another health care professional may be effective in producing short-term changes in physical activity, but adherence to the change is difficult (Eakin, Glasgow, & Riley, 2000) [A]. Advice should be individualised, and goals and monitoring should be agreed with the patient (Estabrooks, Glasgow, & Dzewaltowski, 2003). The effectiveness of the counseling may be increased, if also professionals in physical exercise are involved and a comprehensive service chain is established.
- Exercise carried out at home might be more successful than exercise in special sports facilities (Ashworth et al., 2005) [B]. This also emphasises the many possibilities of exercise incorporated into daily activities (lifestyle activity). On the other hand, guided facility-based exercise may better guarantee the safety of the required exercise intensity, especially when elderly people with possible diseases are concerned (Ashworth, 2005).
- Physical activity programmes have also been arranged by employers either at the workplaces or independently, often as a part of actions to maintain working capacity of employees. Exercise increases the physical activity of the workers and reduces musculoskeletal symptoms, but there is less evidence on the effects on physical fitness and health status. The evidence on the effects of exercise on work absence and other work-related factors is scarce.

Contraindications to Physical Activity

- Physical activity is contraindicated when it causes obvious and significant health risks for the exerciser.
- Factors influencing the assessment whether a certain physical activity is contraindicated or not include the health status of the individual, the characteristics of the intended physical activity (e.g. dynamic versus static

loading and the risk of collisions) and the conditions (e.g. the possibilities to get help if needed).
    - The contraindications can be essentially reduced by appropriate preparation for the physical activity (medication, equipment, clothing, warm-up) and by avoiding harmful factors and risks known to be associated with the exercise (sudden and maximal efforts, competition, risk of collision or falling, cold, heat, air pollutants, allergens, smoking).
- The most important contraindications include diseases and conditions that cause a sudden and severe disturbance in heart function (e.g. arrhythmia, infarction), disturbance in consciousness (e.g. syncope, epileptic seizure), or disturbance in energy metabolism (e.g. unstable diabetes).
- Detailed guidelines concerning cardiovascular contraindications for competitive athletes have been published by the 36th Bethesda Conference of the American College of Cardiology (36th Bethesda Conference Task Forces, 2005).
- Only rarely is all physical activity completely contraindicated; in most diseases and injuries, physical activity that is adjusted to the appropriate limitations is recommendable.
- Examples of contraindications to physical activity are presented in Table 3 of the original guideline document.

Definitions:

Levels of Evidence

A. Strong research-based evidence. Multiple relevant, high-quality scientific studies with homogenic results.
B. Moderate research-based evidence. At least one relevant, high-quality study or multiple adequate studies.
C. Limited research-based evidence. At least one adequate scientific study.
D. No research-based evidence. Expert panel evaluation of other information.

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

REFERENCES SUPPORTING THE RECOMMENDATIONS

References open in a new window

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

Concise summaries of scientific evidence attached to the individual guidelines are the unique feature of the Evidence-Based Medicine Guidelines. The evidence summaries allow the clinician to judge how well-founded the treatment recommendations are. The type of supporting evidence is identified and graded for select recommendations (see the "Major Recommendations" field).

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

Appropriate use of physical activity for the prevention, treatment, and rehabilitation of diseases

POTENTIAL HARMS

- Excessive or incorrect exercise may cause functional disorders or sports injuries. The margin between suitable and excessive exercise (i.e., the therapeutic range of physical activity) may be narrow, particularly for those in poor health.
- Physical activity may impair diabetic control in patients with type 1 diabetes or cause hypoglycaemia. If the patient's blood insulin level is low before exercise, glucose uptake by the muscles will not increase, but the liver will produce large amounts of glucose. This may lead to hyperglycaemia. Vigorous activity may also induce delayed hypoglycaemia
- Sudden overloading and incorrect joint loading during exercise predispose to osteoarthritis.

Subgroups Most Likely to Be Harmed

- The margin between suitable and excessive exercise (i.e., the therapeutic range of physical activity) may be narrow, particularly in those in poor health
- Patients with type 1 diabetes are at higher risk for developing hypoglycaemia or hyperglycaemia from physical activity.

CONTRAINDICATIONS

CONTRAINDICATIONS

In addition to the "Contraindications to Physical Activity" mentioned above in the "Major Recommendations" section, see Table 3 of the original guideline document for specific diseases and injuries and the related contraindicated exercise and instructions.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better
Staying Healthy

IOM DOMAIN

Effectiveness
Patient-centeredness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Finnish Medical Society Duodecim. Physical activity in the prevention, treatment and rehabilitation of diseases. In: EBM Guidelines. Evidence-Based Medicine [Internet]. Helsinki, Finland: Wiley Interscience. John Wiley & Sons; 2006 Dec 22 [Various].

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

2002 May 7 (revised 2006 Dec 22)

GUIDELINE DEVELOPER(S)

Finnish Medical Society Duodecim - Professional Association

SOURCE(S) OF FUNDING

Finnish Medical Society Duodecim

GUIDELINE COMMITTEE

Editorial Team of EBM Guidelines

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Primary Authors: Katriina Kukkonen-Harjula, Ilkka Vuori

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: Finnish Medical Society Duodecim. Physical activity in the prevention, treatment and rehabilitation of diseases. In: EBM Guidelines. Evidence-Based Medicine [CD-ROM]. Helsinki, Finland: Duodecim Medical Publications Ltd.; 2004 Jun 29 [Various].

GUIDELINE AVAILABILITY

This guideline is included in "EBM Guidelines. Evidence-Based Medicine" available from Duodecim Medical Publications, Ltd, PO Box 713, 00101 Helsinki, Finland; e-mail: info@ebm-guidelines.com; Web site: www.ebm-guidelines.com.

AVAILABILITY OF COMPANION DOCUMENTS

None available

PATIENT RESOURCES

None available

NGC STATUS

This summary was completed by ECRI on December 17, 2002. The information was verified by the guideline developer as of February 7, 2003. This summary was updated by ECRI on June 30, 2004, February 17, 2005, and on February 26, 2007

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